CLAIMS

1. A motor comprising: an engine block with a plurality of cylinders arranged to fire with a firing order; and a recirculation system configured to deliver combusted mixture under combustion pressure and temperature from a cylinder which has just fired to at least partly mix with fuel for the next cylinder in the firing order to improve the combustion properties of the fuel.

2. A motor comprising: an engine block with a plurality of cylinders arranged to fire with a firing order; and a recirculation system comprising fluid transfer paths which are arranged to provide a fluid connection between cylinders sequentially in the firing order of the motor, the motor configured such that combustion in a cylinder creates a combusted mixture having a combustion pressure, which combustion pressure forces some of that combusted mixture to at least partly mix with fuel for the next cylinder in the firing order to improve the combustion properties of the fuel.

3. A motor as claimed in claim 1 or 2, wherein each cylinder has an injector body associated therewith, with each injector body having an internal chamber in communication with a fuel inlet port for delivering fuel into the internal chamber, a fuel outlet port for delivering fuel under pressure from the chamber into the associated cylinder, a mixture inlet port and a mixture outlet port, with the mixture inlet port of each injector body in fluid communication with the mixture outlet port of an injector body associated with the immediately preceding cylinder in the firing order of the motor, the motor configured to deliver combusted mixture under combustion pressure and temperature from an outlet port of an injector body associated with a cylinder that has just fired to an inlet port of an injector body associated with the next cylinder in the firing order of the motor to at least partly mix with fuel in the internal chamber of the injector body associated with said next cylinder in the firing order to improve the combustion properties of the fuel.

4. A motor as claimed in claim 3, wherein the fuel inlet port of each injector body is configured for receipt of a respective fuel injector.

5. A motor as claimed in claim 3 or claim 4, wherein each mixture inlet port comprises a non-return valve which allows the mixture to travel into the internal chamber through the port but not out of the internal chamber through the port.

6. A motor as claimed in any one of claims 3 to 5, wherein each mixture outlet port comprises a non-return valve which allows mixture to travel out of the internal chamber through the port but not into the internal chamber through the port.

7. A motor as claimed in any one of claims 3 to 6, wherein each fuel inlet port comprises a non-return valve which allows fuel to flow into the internal chamber through the fuel inlet port, but not out of the internal chamber through the fuel inlet port.

8. A motor as claimed in any one of claims 3 to 7, wherein transfer paths are provided to fluidly connect the mixture inlet port of each injector body with the mixture outlet port of the injector body associated with the immediately preceding cylinder in the firing order.

9. A motor as claimed in claim 8, wherein the transfer paths comprise pipes or tubes.

10. A motor as claimed in claim 1 or 2, wherein the recirculation system is arranged substantially internally within a cylinder head of the motor.

11. A motor as claimed in claim 10, wherein the cylinder head comprises a pre-mix chamber associated with each cylinder, and the cylinder head includes transfer paths configured to deliver combusted mixture under combustion pressure and temperature from the pre-mix chamber associated with a cylinder that has just fired to the pre-mix chamber associated with the next cylinder in the firing order.

12. A motor as claimed in claim 11, wherein each transfer path comprises at least one non-return valve configured to allow combusted mixture under combustion pressure and temperature to be delivered to the pre-mix chamber associated with the next cylinder in the firing order.

13. A motor as claimed in claim 11 or 12, wherein a fluid path is provided between each pre-mix chamber and the respective cylinder.

14. A motor as claimed in claim 13, wherein each fluid path comprises a nozzle to deliver mixture for combustion into the respective cylinder under pressure.

15. A motor as claimed in any one of the preceding claims, wherein the motor is configured to operate in a two-stroke configuration, and wherein the motor is configured such that the combusted mixture is delivered to at least partly mix with the fuel for the next cylinder in the firing order as the piston in said next cylinder is nearing the top of its compression stroke.

16. A motor as claimed in claim 15, wherein the motor is configured such that when a cylinder is on its compression stroke, some uncombusted air/fuel mixture is delivered under relatively low pressure to the next cylinder in the firing order as said next cylinder is undergoing its compression stroke.

17. A motor as claimed in any one of the preceding claims, configured to deliver some uncombusted mixture from a cylinder as its piston is undergoing a compression stroke to a fluid transfer path which provides a fluid connection between that cylinder and the following cylinder in the firing order, such that when combustion occurs in the cylinder, the combusted mixture from that cylinder forces the uncombusted mixture from the transfer path to mix with fuel for the next cylinder in the firing order.

18. A motor as claimed in any one of the preceding claims, wherein the motor is an axial motor.

19. A recirculation system for a motor having a plurality of cylinders arranged to fire with a firing order, comprising: a plurality of fuel injector bodies, each injector body having an internal chamber in communication with a fuel inlet port for delivering fuel into the internal chamber, a fuel outlet port for delivering fuel under pressure into an associated cylinder, a mixture inlet port and a mixture outlet port, and arranged with the mixture inlet port of each injector body in fluid communication with the mixture outlet port of an injector body associated with the immediately preceding cylinder in the firing order of the motor; the recirculation system configured to deliver combusted mixture from an outlet port of an injector body associated with a cylinder that has just fired to an inlet port of the injector

body associated with the next cylinder in the firing order to at least partly mix with fuel in the internal chamber of that next injector body to improve the combustion properties of the fuel.

20. A recirculation system as claimed in claim 19, wherein the fuel inlet port of each injector body is configured for receipt of a respective fuel injector.

21. A recirculation system as claimed in claim 19 or 20, wherein each mixture inlet port comprises a non-return valve which allows the mixture to travel into the internal chamber through the port but not out of the internal chamber through the port.

22. A recirculation system as claimed in any one of claims 19 to 21, wherein each mixture outlet port comprises a non-return valve which allows mixture to travel out of the internal chamber through the port but not into the internal chamber through the port.

23. A recirculation system as claimed in any one of claims 19 to 22, wherein each fuel inlet port comprises a non-return valve which allows fuel to flow into the internal chamber through the fuel inlet port, but not out of the internal chamber through the fuel inlet port.

24. A recirculation system as claimed in any one of claims 19 to 22, wherein the mixture outlet port of each injector body is fluidly connected to the mixture inlet port of the injector body associated with the next cylinder in the firing order of the motor by a transfer path.

25. A recirculation system as claimed in claim 24, wherein each transfer path comprises a pipe or tube.

26. A recirculation system as claimed in any one of claims 19 to 25, configured such that the combusted mixture at least partly atomises the fuel in the internal chamber to which the combusted mixture has been delivered under combustion pressure and temperature.

27. A method of enhancing combustion in a motor having an engine block with a plurality of cylinders arranged to fire with a firing order, comprising delivering combusted mixture under combustion pressure and temperature from a cylinder which has just fired to

at least partly mix with fuel for the next cylinder in the firing order to improve the combustion properties of the fuel.

28. A method as claimed in claim 27, wherein each cylinder has an injector body associated therewith, with each injector body having an internal chamber in communication with a fuel inlet port for delivering fuel into the internal chamber, a fuel outlet port for delivering fuel under pressure from the chamber into the associated cylinder, a mixture inlet port and a mixture outlet port, with the mixture inlet port of each injector body in fluid communication with the mixture outlet port of an injector body associated with the immediately preceding cylinder in the firing order of the motor; and wherein the method comprises delivering combusted mixture under combustion pressure and temperature from an outlet port of an injector body associated with a cylinder that has just fired to an inlet port of an injector body associated with the next cylinder in the firing order of the motor to at least partly mix with fuel in the internal chamber of that adjacent injector to improve the combustion properties of the fuel.

29. A method as claimed in claim 28, wherein transfer paths are provided to link the mixture outlet port of each injector body with the mixture inlet port of the injector body associated with the next cylinder in the firing order, and the step of delivering combusted mixture under combustion pressure and temperature from an outlet port of an injector body associated with a cylinder that has just fired to an inlet port of an injector body associated with the next cylinder in the firing order of the motor, comprises transferring the combusted mixture via the respective transfer path.

30. A method as claimed in claim 27, wherein the recirculation occurs internally within a cylinder head of the motor.

31. A method as claimed in claim 30, wherein a pre-mix chamber is associated with each cylinder, and the method comprises delivering combusted mixture under combustion pressure and temperature from the pre-mix chamber associated with a cylinder that has just fired to the pre-mix chamber associated with the next cylinder in the firing order.

32. A method as claimed in claim 31, comprising delivering mixture for combustion from each pre-mix chamber into the respective cylinder under pressure.

33. A method as claimed in any one of claims 27 to 32, wherein the motor is configured to operate in a two-stroke configuration, and the step of delivering combusted mixture under combustion pressure and temperature from a cylinder which has just fired to at least partly mix with fuel for the next cylinder in the firing order occurs as the piston in said next cylinder is nearing the top of its compression stroke.

34. A method as claimed in claim 33, comprising delivering from a cylinder on its compression stroke some uncombusted air/fuel mixture under relatively low pressure to the next cylinder in the firing order as said next cylinder is undergoing its compression stroke.

35. A method as claimed in any one of claims 27 to 34, comprising delivering some uncombusted mixture from a cylinder as its piston is undergoing a compression stroke to a fluid transfer path which provides a fluid connection between that cylinder and the following cylinder in the firing order, such that when combustion occurs in the cylinder, the combusted mixture from that cylinder forces the uncombusted mixture from the transfer path to mix with fuel for the next cylinder in the firing order.